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Rio Blanco Oil Shale Project

May 1977 ADDENDUM

to the

Social and Economic

Impact Statement

of March 1976

Gulf Oil Corporation . Standard Oil Company (Indiana)

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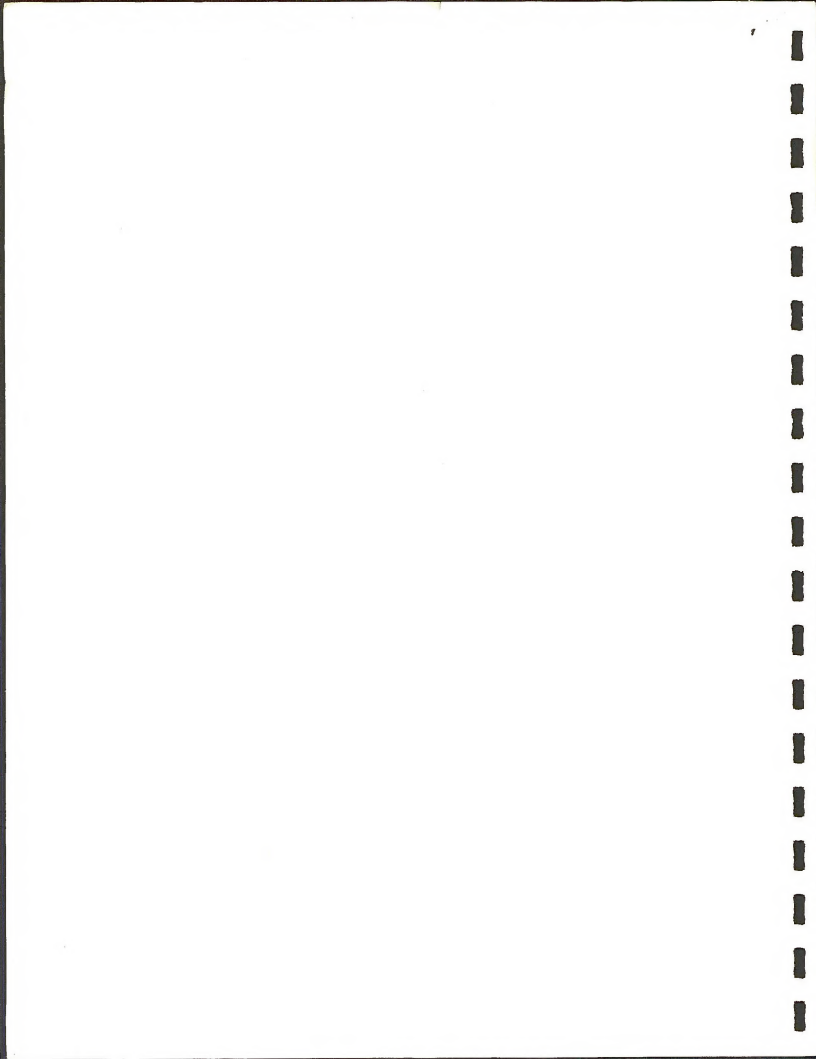
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Addendum

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ADDENDUM TO
Social and Economic
Impact Statement
Tract C-a

PREFACE

This addendum is designed to update information where believed necessary. Changes in the Social and Economic Impact Statement caused by modification of the Detailed Development Plan are noted on a chapter by chapter basis. The addendum does not replace the Statement submitted with the original DDP in March of 1976; it updates information and reflects necessary revisions brought about by the change to Modified In Situ development of Federal Prototype Oil Shale Tract C-a.

BACKGROUND

The Rio Blanco Oil Shale Project of Gulf Oil Corporation and Standard Oil Company (Indiana) has been committed to responsible social and economic planning since the project was formed.

The management of the RBOSP believes the people who will be the most affected by oil shale development should be the ones who make community development decisions. Industry should assist communities but should not do the planning.

One of the earliest actions by RBOSP was the contribution of \$40,000 to Rio Blanco County to assist in the preparation of a county master plan. That plan has been completed and adopted by the county.

In addition to the financial assistance to the county, RBOSP's socioeconomic approach is based on the work of the Foundation for Urban and Neighborhood Development (FUND), the Gulf Oil Real Estate Development Company (GORED CO), Morrison-Knudsen, Inc. (M-K), and the Rio Blanco Oil Shale Project staff.

In the summer of 1974, RBOSP located a Manager of Community Affairs in Grand Junction to serve as liaison to the people in the oil shale development area. That office remains open today.

In 1975, FUND was employed to study the communities likely to be impacted by RBOSP development. FUND, with an experienced staff in social and community work, concentrated on Meeker and Rangely. After several months of work, it became apparent that if a new road could be constructed by the State of Colorado to connect Tract C-a with Rangely, that community would be the most likely location for RBOSP employees.

The majority of the people in Rangely indicated the growth was desired. Rangely is an oil town and while the population is now about 1,800, the town had about 4,000 people in the "boom" days of the 1950's. Therefore, some infrastructure to support additional people is already there.

GOEDCO was also employed in 1975 to work with the town of Rangely in the development of a master plan for growth. GOEDCO provided the technical planning and engineering expertise to Rangely; citizens provided input as to where development should be and in what form.

The plan was completed in 1976 and provides detail for development under the growth unit concept, which is an approach that complements RBOSP's planned modular development method of producing shale oil from Tract C-a. The growth unit plan calls for the addition of modules of infrastructure (homes, schoolrooms, hospital rooms, sewage treatment plant expansion, etc.) when it becomes apparent that the town will grow by a pre-determined unit such as 500 people. Specific areas are chronologically designated for development under the concept.

The completed Rangely document includes residential growth plans, transportation (road and air) systems, flood protection, water supply, utilities, educational considerations, recreation areas, industrial locations, community services and agricultural lands. Certain growth priorities are established, land costs are projected, capital costs are estimated, and various funding methods are examined. The plan consists of more than 100 pages of narrative, maps, charts and tables.

Projected numbers of workers and resultant population growth were developed by Morrison-Knudsen, Inc., Golder Associates, Inc., and the Rio Blanco Oil Shale Project. Updated population projections based on the Modified In Situ approach to development are found in Chapter 4 of this addendum.

A critical factor which will affect Rangely's growth in the future is the need to acquire adjacent Federal land for community expansion. The Federal Land Management Policy Act of 1976 permits the U. S. Department of the Interior to make land available to communities by trade or sale. At this printing, efforts are underway by Rangely to acquire all or a portion of the 2,500 Federal acres deemed necessary for municipal expansion.

The value of the Rangely Master Plan to respond to growth from Tract C-a still depends on an extension of Rio Blanco County Road 24. The key to the extension is 22 miles of new road construction from Tract C-a to Rangely plus improvement of 16 miles of existing road from the tract east to Piceance Creek Road. The total cost of the 38 miles of road from Piceance Creek Road to Rangely is estimated at \$12.2 million. The road design has been completely engineered and could be constructed in about one year. Until the road is completed, a majority of employees may be expected to live in Meeker and other communities in Rio Blanco or Garfield Counties. Upon completion of the road, it is expected that growth pressures will center on Rangely. Until then, RBOSP will work with other affected communities. However, the distribution of RBOSP employees will be difficult to predict accurately.

Gulf and Standard have contributed more than \$47 million to the total \$73 million placed in Colorado's Oil Shale Trust Fund designed to offset socioeconomic impact of oil shale development. The \$73 million represents 37½% of the first three bonus payments paid for Federal Prototype Oil Shale leases C-a and C-b.

Where necessary or desirable, new information is provided for Chapters 1 through 5. Appendix A is completely replaced by a new Detailed Development Plan abstract. More recent population figures are provided as an addition to Appendix B.

ADDENDUM

Chapter 1

The history of the leasing of Federal Prototype Tract C-a and subsequent activities of the Rio Blanco Oil Shale Project are found in Chapter One of the March 1976 Social and Economic Impact Statement. That information has not changed.

Collection of baseline data referred to in this chapter has been completed. Environmental monitoring programs in the Tract C-a area are underway, and are described in the Detailed Development Plan. Changes in mining and processing are reviewed in the DDP abstract found in the new Appendix A.

Chapter 2

Tract C-a is located in the western third of Rio Blanco County, Colorado, about midway and slightly south of a line between Denver and Salt Lake City. It is about 20 miles southeast of Rangely, 35 miles southwest of Meeker and some 55 miles due north of Grand Junction (see Figure 2-1).

The populations of the existing surrounding communities and their distances from Tract C-a by existing roads are as follows:

<u>Community</u>	<u>Miles</u>	<u>1977 Population*</u>
Meeker	51	1,848
Rifle	58	2,242
Rangely	68	1,872
Glenwood Springs	89	4,040

Commuting distance for employees could be reduced to about 25 miles by the extension of Rio Blanco County Road 24 from Tract C-a to Rangely. Completion of the new portion of the road northwest to Rangely, plus improvement of the existing road east from C-a to the Piceance Creek Road is supported by RBOSP and the citizens of Rangely and other nearby communities. A map of the proposed extension is found in the DDP abstract in Appendix A.

*Source: Special Census, U. S. Census Bureau (see Appendix B for detail)

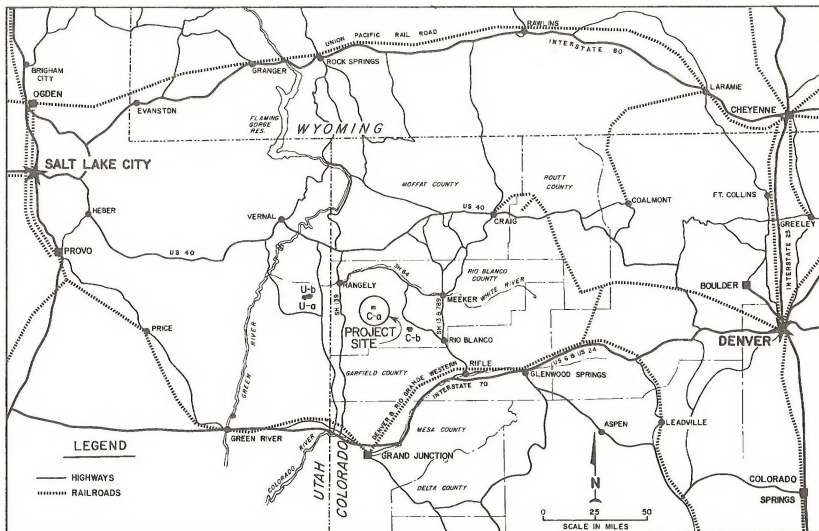


Figure 2-1
REGIONAL MAP SHOWING LOCATION OF TRACT C-a
(from Statement of March, 1976)

The Morrison-Knudsen report, "Access Road C-a to Rangely," of November 14, 1975, included estimates for daily round trips from Rangely or Meeker to project a benefit/cost ratio. Since the MIS plan projects a total of about 500 more employees than the previous development plan at about 50,000 barrels per day production, some of the numbers must be revised. The basic multipliers, however, remain the same.

The benefit/cost ratio is calculated by comparing costs, with the baseline being all traffic going to Meeker (no C-a to Rangely road). Assuming vehicle operating cost at 9 cents per mile and time at 5 cents per minute, the trip cost is \$3.73 for the new road against \$8.14 to Meeker; the annual road user savings is \$1,671,791. After deducting additional maintenance costs, the annual road user benefit is \$1,642,496. Capitalized to a present worth, with a 30-year life and interest at 10%, the road user benefits are \$15,331,922. Dividing this by the estimated cost of the road (\$12,212,416), the benefit/cost ratio is 1.25, based on very conservative assumptions.

The fuel savings (energy conservation) per vehicle, assuming 15 miles per gallon, is 2,092 gallons per year. For all traffic, this is 662,780 gal/yr. The monetary benefit of this fuel economy is included in the benefit/cost calculation, but the energy conservation is also significant.

Further, the reduction in vehicle miles traveled would statistically reduce fatalities by one death approximately every three years, and non-fatal injuries due to accidents by more than five per year. The time saving, evaluated in the benefit/cost calculation, should also be noted -- more than an hour of time saved, with the C-a to Rangely road, giving workers more time to devote to activities with their families and communities. This is a considerable factor when trying to establish and maintain stable, productive community environments.

Several northwestern Colorado communities have started to add infrastructure in anticipation of oil shale development. A great deal of the work being done is funded by appropriations from the State of Colorado's Oil Shale Trust Fund. Work is going on in Rangely and Rifle to expand sewer systems. These two communities, plus Meeker, are improving and expanding their water

systems. Money has been appropriated for the Meeker and Rifle schools. Funds were also appropriated for improvement of the Piceance Creek Road in Rio Blanco County and the Bonanza Road from Rangely to the Utah line, and monies were made available for county planning.

In addition to the money appropriated from the Oil Shale Trust Fund for direct Federal oil shale lease-related impact, other counties have received funding. For instance, appropriations have been made for Moffat, Garfield, Routt and Delta Counties, to assist in dealing with impacts stemming primarily from coal development.

Chapter 3

The information in this chapter which details RBOSP's efforts in developing the Rangely Master Plan is still valid. Until the total 38 miles of road is completed, RBOSP will cooperate with other communities which could be temporarily affected by C-a development. In the interim, RBOSP will keep affected communities informed of Tract C-a plans and activities.

Chapter 4

A new RBOSP Construction and Operation Schedule, Figure 4-1, shows the Modified In Situ timetable. Five specific charts showing employee numbers for the first five years of the MIS Modular Development Phase replace Table 4-1 of the March 1976 Statement. An updated population growth curve to 1985 (Figure 4-2) replaces the Figure 4-2 in the March 1976 Statement. The projections are based on a maximum commercial production of 50,000 barrels per day. However, if commercial production were to reach a potential higher rate of 76,000 barrels per day, population caused by C-a development could reach a peak of 9,250 by 1986 and plateau at 7,680 by 1987.

Again, information pertaining to time schedules and operations should be obtained from the new MIS schedule in Chapter 4 and the revised DDP abstract in Appendix A.

The section in Chapter 4 pertaining to mitigation remains the same.

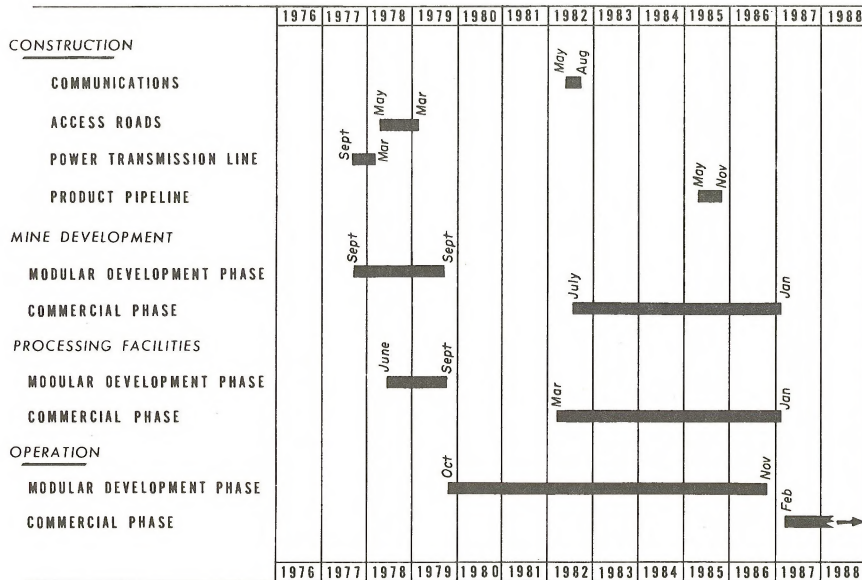


Figure 4-1

RBOSP CONSTRUCTION AND OPERATION SCHEDULE
(Replaces Figure 4-1 in March, 1976 Statement)

RBOSP POPULATION PROJECTIONS - 1977

5-9-77

CONSTRUCTION

(Population Distribution)

Number of Workers	New Population	Rangely		Meeker		Rifle		Glenwood Springs	
		w/road 77%	w/o road 13%	w/road 9%	w/o road 39%	w/road 6%	w/o road 24%	w/road 8%	w/o road 24%
110 x .1 local = 11	0								
x .9 new = 99	300								
(x .8 married = 79 x 3.8 family average	20								
(x .2 single = 20 x 1.0									
Service x .5 of total jobs*									
55 (x .52 local	0								
(x .48 new =	80								
(26 x .8 married = 21 x 3.8 family avg.	5								
(26 x .2 single = 5 x 1.0									
Total Construction	405	312	53	37	158	24	97	32	97

OPERATING

40 x .1 local = 4	0								
x .9 new = 36	110								
(x .8 married = 29 x 3.8 family average	7								
(x .2 single = 7 x 1.0									
Service x .5 of total jobs*									
20 (x .52 local	0								
(x .48 new =	30								
(10 x .8 married = 8 x 3.8 family avg.	2								
(10 x .2 single = 2 x 1.0									
Total Operating	149	115	19	13	58	9	36	12	36
TOTAL	554	427	72	50	216	33	133	44	133

*Secondary employment such as new business, schools, and services created by new industry

-9a- (Replaces Table 4-1 in March 1976 Statement)

RBOSP POPULATION PROJECTIONS - 1978

5-9-77

CONSTRUCTION

<u>Number of Workers</u>		<u>New Population</u>
280 x .1 local = 28		0
x .9 new = 252 (x .8 married = 202 x 3.8 family average x .2 single = 50 x 1.0		768 50
Service x .5 of total jobs*		
(x .52 local		0
140 (x .48 new = (67 x .8 married = 53 x 3.8 fam. avg. 205 (67 x .2 single = 13 x 1.0 13		
Total Construction	1,036	

(Population Distribution)

Rangely		Meeker		Rifle		Glenwood Springs	
w/road 77%	w/o road 13%	w/road 9%	w/o road 39%	w/road 6%	w/o road 24%	w/road 8%	w/o road 24%
798	134	93	404	62	249	83	249

OPERATING

120 x .1 local = 12		0
x .9 new = 108 (x .8 married = 86 x 3.8 family average 327 x .2 single = 22 x 1.0 22		
Service x .5 of total jobs*		
(x .52 local		0
60 (x .48 new = (29 x .8 married = 23 x 3.8 family avg. 87 (29 x .2 single = 6 x 1.0 6		
Total Operating	442	
TOTAL	1,478	

340	58	40	172	27	106	35	106
1,138	192	133	576	89	355	118	355

*Secondary employment such as new business, schools, and services created by new industry

-9b- (Replaces Table 4-1 in March 1976 Statement)

RBOSP POPULATION PROJECTIONS - 1979

5-9-77

CONSTRUCTIONNew
PopulationNumber of Workers

$30 \times .1 \text{ local} = 3$

$$\begin{aligned}
 &x .8 \text{ married} = 22 \times 3.8 \text{ family average} \\
 &x .9 \text{ new} = 27 \quad (x .2 \text{ single} - 5 \times 1.0)
 \end{aligned}$$

0

84
5

Service x .5
of total jobs*

15

$(x .52 \text{ local})$

0

$$\begin{aligned}
 &(x .48 \text{ new} = (7 \times .8 \text{ married} = 6 \times 3.8 \text{ family avg.} \\
 &\quad (7 \times .2 \text{ single} = 1 \times 1.0)
 \end{aligned}$$

23

1

Total Construction 113

(Population Distribution)

Glenwood
Springs

Rangely		Meeker		Rifle		Glenwood Springs	
w/road 77%	w/o road 13%	w/road 9%	w/o road 39%	w/road 6%	w/o road 24%	w/road 8%	w/o road 24%

87	15	10	44	7	27	9	27
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OPERATING

$220 \times .1 \text{ local} = 22$

0

$$\begin{aligned}
 &x .8 \text{ married} = 158 \times 3.8 \text{ family average} \\
 &x .9 \text{ new} = 198 \quad (x .2 \text{ single} = 40 \times 1.0)
 \end{aligned}$$

600

40

Service x .5
of total jobs*

110

$(x .52 \text{ local})$

0

$$\begin{aligned}
 &(x .48 \text{ new} = (53 \times .8 \text{ married} = 42 \times 3.8 \text{ family avg.} \\
 &\quad (53 \times .2 \text{ single}
 \end{aligned}$$

160

11Total Operating 811

TOTAL 924

624	105	73	316	49	195	65	195
711	120	83	360	56	222	74	222

*Secondary employment such as new business,
schools, and services created by new industry

-9c- (Replaces Table 4-1 in March 1976 Statement)

RBOSP POPULATION PROJECTIONS - 1980

5-9-77

Number of Workers

240 x .1 local = 24

x .9 new = 216 (x .8 married = 173 x 3.8 family average
(x .2 single = 43 x 1.0

Service x .5
or total jobs*

(x .52 local

120 (x .48 new = (58 x .8 married = 46 x 3.8 family avg. 175
(58 x .2 single = 12 x 1.0 12

Total Construction

CONSTRUCTION

New
Population

(Population Distribution)

Rangely		Meeker		Rifle		Glenwood Springs	
w/road 77%	w/o road 13%	w/road 9%	w/o road 39%	w/road 6%	w/o road 24%	w/road 8%	w/o road 24%
683	115	80	346	53	213	71	213

OPERATING

220 x .1 local = 22

= 198 (x .8 married = 158 x 3.8 family average
(x .2 single = 40 x 1.0

Service x .5
or total jobs*

(x .52 local

110 (x .48 new = (53 x .8 married = 42 x 3.8 fam. avg. 160
(53 x .2 single = 11 x 1.0 11

Total Operating

TOTAL 1,698

624	105	73	316	49	195	65	195
1,307	220	153	662	102	408	136	408

*Secondary employment such as new business,
schools, and services created by new industry
-9d- (Replaces Table 4-1 in March 1976 Statement)

RBOSP POPULATION PROJECTIONS - 1981

5-9-77

CONSTRUCTION

<u>Number of Workers</u>		<u>New Population</u>
275 x .1 local =	28	0
x .9 new =	247	752
(x .8 married = 198 x 3.8 family average x .2 single = 50 x 1.0		50
Service x .5 of total jobs*		
(x .52 local		0
137	(x .48 new = (66 x .8 married = 53 x 3.8 family avg. 201 66 x .2 single = 13 x 1.0	13
Total Construction		1,016

(Population Distribution)

Rangely		Meeker		Rifle		Glenwood Springs	
w/road 77%	w/o road 13%	w/road 9%	w/o road 39%	w/road 6%	w/o road 24%	w/road 8%	w/o road 24%
782	132	92	396	61	244	81	244

OPERATING

325 x .1 local =	33	0
x .9 new =	292	889
(x .8 married = 234 x 3.8 family average x .2 single = 59 x 1.0		59
Service x .5 of total jobs*		
(x .52 local		0
163	(x .48 new = (78 x .8 married = 62 x 3.8 family avg. 236 78 x .2 single = 16 x 1.0	16
Total Operating		1,200

924	156	108	468	72	288	96	288
1,706	288	200	864	133	532	177	532

*Secondary employment such as new business,
schools, and services created by new industry

TOTAL 2,216

-9e- (Replaces Table 4-1 in March 1976 Statement)

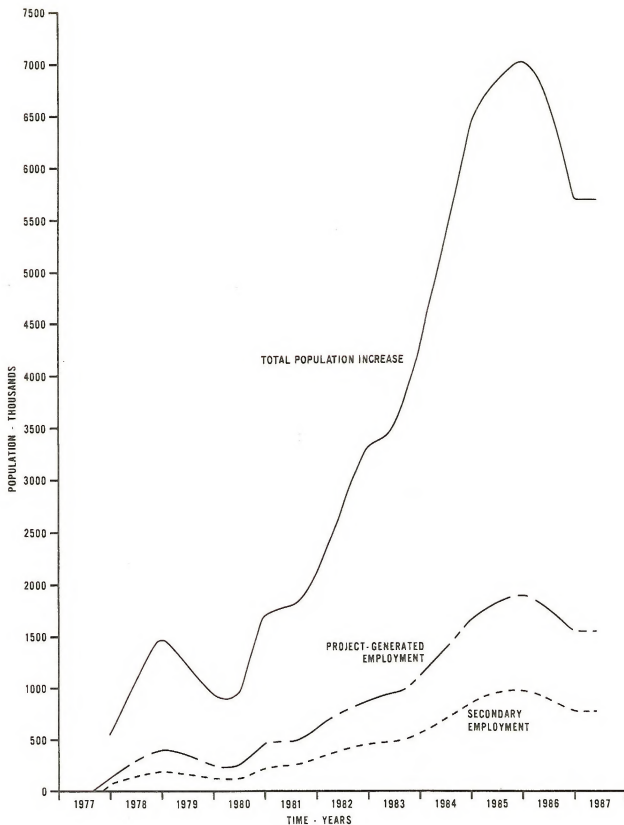


FIGURE 4-2
PROJECTION OF NEW POPULATION ATTRIBUTABLE TO TRACT C-a DEVELOPMENT
(Replaces Figure 4-2 in March 1976 Statement)

An organization to address oil shale impact in Rio Blanco County has been formed. The group includes representatives from the County, the State of Colorado, the Colorado West Council of Governments, the Federal Government, the towns of Meeker and Rangely, educational organizations, church groups, health organizations and industry. The Rio Blanco Oil Shale Project is a member.

Information on projected numbers of workers has been made available to affected communities as soon as it became available. Participation in planning and other community efforts will be offered by RBOSP.

RBOSP's Manager of Community Affairs, currently based in Grand Junction, will continue to remain active in efforts to assist and communicate with concerned western Colorado governmental entities.

Chapter 5

The need for a state-developed regional growth management plan continues. If construction of the Rangely road is delayed by a year or more, the plan will be more critically needed. It is important that industry maintain its role as developer of energy and provider of jobs in a socially responsible way, while the state maintains its role of directing planned and orderly economic growth which is responsive to its affected citizens.



REVISED DDP ABSTRACT

In 1969, the U. S. Department of the Interior initiated planning for a prototype oil shale leasing program that eventually resulted in Gulf Oil Corporation and Standard Oil Company (Indiana) acquiring an oil shale lease for Tract C-a in the Piceance Creek basin of northwest Colorado. Gulf and Standard submitted the high bonus bid for Tract C-a (\$210,305,600) at a lease sale in Denver on January 8, 1974. Rio Blanco Oil Shale Project (RBOSP), an organization directed and staffed by representatives of Gulf and Standard, was formed later that year for the purpose of developing the tract.

RBOSP has conducted extensive geotechnical and environmental data collection programs to establish baseline conditions on and around Tract C-a and to provide input for the selection of mining and processing plans. This revised Detailed Development Plan (DDP) describes RBOSP's proposed development and operation of a commercial-scale oil shale complex and support facilities on and around Tract C-a. The development plan, environmental protection plans and environmental monitoring programs are based on the best technology presently available. Specific details of the engineering and environmental projections will change because of continually improving technology in these areas. RBOSP will be flexible and responsive to changes in information and technology and will incorporate new information into the project plans wherever warranted.

Before RBOSP can proceed with development of Tract C-a, several approvals and permits must be obtained from County, State and Federal governments. Among these are approval of the DDP, and acquisition of necessary rights-of-way and all permits for construction and operations, which presupposes the emissions and effluents from the operation will be acceptable under State and Federal regulations.

PROJECT DESCRIPTION

This revised DDP presents a 40-year plan for developing the oil shale resource on Tract C-a. This includes a 10-year Modular Development

Phase and a 30-year Commercial Phase. At the end of that time, approximately one-half of the tract will have been developed. RBOSP will develop the resources consistent with environmental, technical and economic constraints which prevail now or may exist in the future.

Development will consist of Modified In Situ (MIS) recovery of shale oil, on-tract surface retorting of the material brought to the surface, on-tract disposal of processed shale and waste materials and on-tract support facilities. The MIS method to be used by the Rio Blanco Oil Shale Project employs well known sublevel caving mining methods in combination with technology similar to in situ recovery of heavy oil from sand reservoirs in conventional oil fields. Mining involves the sinking of vertical shafts followed by development of rubblized zones which become underground retorts. The deposit is divided into cells of rubblized oil shale separated by pillars of undisturbed oil shale. Because most retorting occurs underground, the need for large off-tract processing and disposal areas is eliminated. The MIS method is considered by RBOSP as the best technique for achieving a combination of good resource recovery, minimum environmental impact and economic acceptability.

The two phases of the MIS operations include a Modular Development Phase and a Commercial Phase. The Modular Development Phase will consist of underground retorting only and will be conducted near the center of the commercial mine area during the first 10 years of operation (1977-86, including construction). During this time period, a number of retorts will be built and burned in sequence to gain operating experience, improve process efficiency, and confirm capital and operating costs for a commercial operation. The beginning of construction for the Modular Development Phase and all subsequent dates is keyed to timely approval of the DDP and the end of the suspension of operations granted by the Department of the Interior in 1976.

Engineering and construction for the Commercial Phase will begin in 1982 after results of the first prototype commercial-size retort, to be built

in 1981, have been analyzed. Completion of commercial-size retorts and support facilities is anticipated to take up to five years. During this period, single commercial-size prototype retorts will continue to be burned as part of the Modular Development Phase. Table 1 is a summary of information pertinent to RBOSP's proposed development of Tract C-a. Figure 1 depicts the location of proposed facilities.

The Modular Development Phase consists of developing several retorts off the same shaft. Retorts 1 and 2, starting in 1979, will allow evaluation of the retorting model prediction, provide practical field operating experience and supply samples for laboratory and field experiments. Retorts 3 and 4 will test mining concepts and the scaling-up of the size of the retorts. These two retorts will be developed and burned in 1980 and 1981.

Commercial scale operating conditions will be demonstrated in Retort 5 and beyond, with operations beginning in 1981. These retorts are large enough to be developed by the sublevel caving method. Objectives for the remaining prototype commercial retorts are to evaluate commercial-size retorts and continue to optimize both mining and retorting operations while the commercial facilities are under construction.

The shale oil produced in all Modular Development Phase retorts will be pumped to the surface and trucked to a market point. During this phase, a permit will be obtained from the Colorado Department of Health to thermally oxidize the gases before they are vented to the atmosphere. Mined material in the Modular Development Phase will be trucked from the mine and used for fill as required; the balance will be piled and re-vegetated.

Engineering and conceptual design work on the proposed facilities is based on producing 76,000 barrels per stream day (BPSD). This higher production rate resulted from conservative original estimates of component capacity. However, RBOSP intends to demonstrate commercial feasibility and other objectives of the prototype oil shale program at

an initial rate of about 50,000 BPSD. Should future conditions warrant, production could be expanded to 76,000 BPSD.

All environmental assessment was based on 76,000 BPSD production rate. The assessments and models show that RBOSP can satisfy environmental stipulations and regulations at this higher production rate. They can easily be met at the rate of 50,000 BPSD since environmental effects will be reduced in proportion to plant capacity.

Table 1

RIO BLANCO PROJECT SUMMARY

	<u>MODULAR DEVELOPMENT PHASE</u>	<u>COMMERCIAL PHASE</u>
Timing		
Construction	Sept. 1977-Oct. 1979	June 1982-Jan. 1987
Operation	Begin Oct. 1979	Begin Feb. 1987
Mine Development		
Ore Production (Average Brought to Surface)	Retorts 1-5, 500 TPSD	40,000 TPSD
Ore Rubblized (In Situ)	Retorts 6 & up, 3000 TPSD	134,000 TPSD
Ore Haulage (Surface)	Up to 12,000 TPSD Truck	Belt Conveyors
Processing		
Retorting-Surface	-	TOSCO II
Retorting-Underground	Modified In Situ	Modified In Situ
Processed Shale Haulage	-	Belt Conveyors
Products		
Shale Oil	Up to 4000 BPSD	76,000 BPSD
Sulfur	-	265 LTPSD
Product Movement	Truck (Shale Oil)	Pipeline (Shale Oil) Truck (Sulfur)
Net Groundwater Used	Up to 1000 AFY	2200 AFY
Power (Purchased)	Up to 40 MW	100 MW
Peak Employment	2500 for 76,000 BPSD 1900 for 50,000 BPSD	2075 for 76,000 BPSD 1550 for 50,000 BPSD

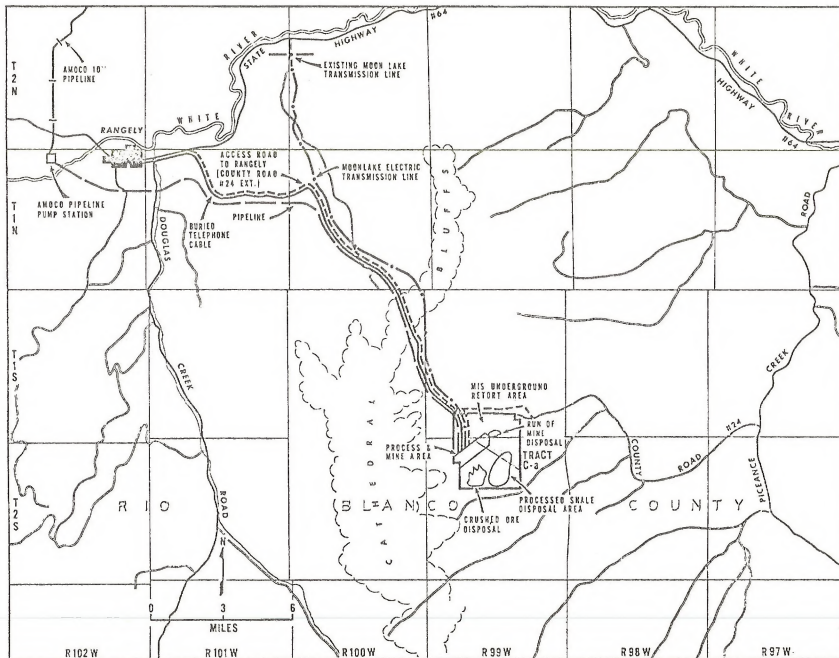


Figure 1
LOCATION OF RBOSP FACILITIES

Information learned from early commercial-size retorts will be used for engineering and construction of commercial production and service shafts, surface retorts, and support facilities beginning in 1982. The rubblized retorts for the Commercial Phase are designed to have void ratios of approximately 20% produced by mining and rubblization. Underground retorting by the Modified In Situ method could produce up to 57,000 BPSD. The ore produced in developing the voids will be crushed underground and stockpiled on the surface. The material will then be surface retorted to produce up to an additional 19,000 BPSD, bringing the total shale oil production to 76,000 BPSD. Sulfur will be recovered during the commercial operation. The low BTU offgases produced in the Commercial Phase will be utilized for power generation to supply most of RBOSP's electrical requirements.

The MIS retorts for 30 years of commercial production includes the richest, thickest oil shale within Tract C-a which is located in the northeast quadrant. The area proposed for retorting represents 10 years of modular development plus 30 years of commercial production and consists of about one-half of the tract.

Location of the disposal site for processed shale and the plant site are both on Tract C-a. Rinky Dink Gulch was selected for processed shale disposal because it is on tract and in an area of minimum surface drainage. Operationally, it is sufficient in size to hold the waste products and is close to the processing operations. Investigations are underway to determine if part or all of the processed shale could be injected into the spent retorts by slurring for (1) ground stabilization, (2) sealing the retorts against leaching by groundwater, and (3) disposal of the processed shale. Selection of the processing facility site was based on its close proximity to the mine and disposal area which will reduce acreage disturbance. Also, the elevated topography will enhance dispersion of stack emissions and the relatively level terrain will minimize disturbance.

During the Modular Development Phase, the ore removed to create the 20% underground void volume will be transported to the disposal area by truck. During the Commercial Phase, it will be transported from the MIS mine area to the processing facility by belt conveyor. After surface retorting, processed shale will be transported to the disposal area from the plant site by belt conveyor. As final slopes are established on the disposal pile, the processed shale will be covered by coarse, crushed materials and covered with soil from the disposal areas. The disposal pile will be contoured, revegetated and progressively reclaimed as operations proceed.

During the Modular Development Phase, shale oil will be trucked to an existing refinery or markets. In the Commercial Phase, shale oil will be transported by pipeline to Rangely, Colorado. It will then be pumped through an existing Amoco pipeline to other connecting carriers for ultimate delivery to refineries or markets in the West or Midwest. If necessary, flow improvers will be added to the raw shale oil to make it a pipelineable product. The by-product sulfur recovered from retorting will be trucked from Tract C-a to rail facilities near Rifle, Colorado.

Mine dewatering during the Modular Development and Commercial Phases will produce more water than is required for project needs. This excess water will be reinjected off-tract into the basin's aquifers. Up to 1000 acre-feet/year (AFY) of groundwater will be used during the Modular Development Phase, obtained from mine seepage and/or the dewatering wells. During the Commercial Phase, approximately 2200 AFY of groundwater will be used.

RBOSP will require the purchase of up to 40 megawatts (MW) of electricity during the Modular Development Phase operations. The demand will increase to about 100 MW during the Commercial Phase. Moon Lake Electric Association will supply electricity to Tract C-a via a 138 KV transmission line from an existing line near the White River 20 miles north of the tract. RBOSP will utilize the low BTU gas produced from MIS retorting to produce most of its electric power needs during the Commercial Phase.

Mountain Bell Telephone Company will provide communications from Rangely for commercial construction and operations. Vehicular access to Tract C-a will be via Rio Blanco County Road 24 (Ryan Gulch Road) from the east and via an extension of this road from the tract to Rangely on the west. The power transmission line, shale oil pipeline, and access road will be located, wherever possible, in a common corridor between Rangely and Tract C-a in accordance with the present Bureau of Land Management corridor concepts.

BASELINE ENVIRONMENTAL AND GEOTECHNICAL CONDITIONS

Collection of baseline environmental data on and around Tract C-a began in October, 1974. Since individual tasks started at various times, two full years of collection in some categories were not completed until early February, 1977. The program was designed to gather extensive environmental data for the purposes of (1) complying with lease stipulations to describe baseline environmental conditions prior to development and, (2) developing a scientifically sound environmental data base to help in the design of an environmentally acceptable DDP. During planning and development of the baseline programs, environmental lease stipulations were subjected to critical review. Potential data gaps inherent in the stipulations were identified and suggestions for amendments to the lease were made.

After thorough evaluation and study, a final scope of work was submitted to and approved by the Area Oil Shale Supervisor (AOSS) following review and recommendation by the Oil Shale Environmental Advisory Panel.

Programs were developed to study several areas of environmental concern including meteorology and air quality, and terrestrial and aquatic ecology. The programs were also designed to describe interrelationships among components of the ecosystem and identify areas of cultural resources. The environmental baseline conditions and analyses upon which the DDP environmental information is based were submitted as a separate report to the AOSS in May, 1977 entitled "Final Environmental Baseline Report for Tract C-a and Vicinity."

Geotechnical data gathering, including geologic and hydrologic resource evaluation through core hole drilling and geophysical logging, began in July of 1974. The geologic program conducted by RBOSP provides detailed structural, stratigraphic and resource data.

The hydrologic program conducted by RBOSP provides the data for determining the hydrologic environmental baseline, aquifer characteristics, and quality and quantity of water expected to be produced from various mining plans.

ENVIRONMENTAL PROTECTION

RBOSP's plan is to construct and operate an environmentally acceptable oil shale operation. Specific environmental protection procedures have been developed to ensure compliance with lease provisions and with all applicable Federal, State and local environmental protection and pollution control regulations. The procedures and mitigation plans are designed specifically for RBOSP's intended development of Tract C-a and will be modified as necessary with changing conditions. The protection procedures described in the development plan cover the following topics:

- Health and Safety
- Air Quality Control
- Water Quality Control
- Solid Waste Control
- Noise Control
- Aesthetics
- Abandonment
- Fish and Wildlife Management
- Land Rehabilitation
- Oil and Hazardous Materials Control
- Fire Prevention and Control
- Protection of Objects of Historic and Scientific Interest
- Subsidence Control

RBOSP's assessment of potential environmental impacts which could result from Tract C-a activities include studies of air and water quality, terrestrial and aquatic biology, and cultural resources. Assessments were based on emissions, dispersion modeling and tracer studies, water flow modeling, and in-depth analyses of environmental baseline.

Environmental monitoring programs have been designed to provide data which will identify impacts to the environment resulting from development activities. Changes from conditions existing prior to development as established by the baseline data collection program will be recorded. These programs will allow evaluation of the success of the mitigation plans. Should the monitoring programs show that the control plans are not working as predicted, the control plans will be modified to enhance their effectiveness.

A monitoring program has been initiated since the baseline programs were completed on Tract C-a. Monitoring will continue, as the lease requires, until the Area Oil Shale Supervisor determines to his satisfaction that environmental conditions consistent with Federal and State statutes and regulations have been established.

SOCIAL AND ECONOMIC PLANNING

Gulf and Standard began working with the people of northwestern Colorado shortly after acquiring the Tract C-a lease in 1974. Recognizing the importance of dealing with the potential social and economic impacts of oil shale development, the companies participated in planning with local, County, State and Federal governmental agencies.

Although a social and economic impact statement was not required by the Tract C-a lease, RBOSP officials and the Area Oil Shale Supervisor felt such a plan was desirable. Therefore, the Social and Economic Impact Statement for Tract C-a was submitted as a separate document along with the Detailed Development Plan. An addendum which updates the statement was submitted with the revised DDP.

The overall objective of the plan is to reduce negative impacts which have occurred in other areas because of industrial activity. In addition to the Social and Economic Impact Statement, Gulf and Standard sponsored the preparation of a master plan for the town of Rangely, Colorado, which has been adopted by the community and has been certified by Rio Blanco County.

DDP ORGANIZATION AND USE

RBOSP's DDP consists of 8 sections comprising 3 volumes, as depicted in the chart on page 12. Volume 1 is the "Executive Summary". If one is interested in an overview of the development plan, Volume 1 is recommended.

Volume 2 describes engineering plans for developing Tract C-a and includes sections on mining, processing, processed shale disposal and support facilities. Volume 3 describes RBOSP's environmental protection plans and also includes sections concerning environmental assessment and monitoring. The Confidential Volume, which is not publicly available, contains proprietary information concerning oil shale properties, ore reserves and cost estimates.

Except for this DDP abstract, a 3-number page numbering system is used throughout the development plan. Any given page number is unique in that it is not repeated elsewhere in the DDP. Page numbers are keyed to chapters within sections; page 2-6-15, for example, refers to Section 2, Chapter 6, page 15.

RIO BLANCO OIL SHALE PROJECT

MIS-DETAILED DEVELOPMENT PLAN ORGANIZATION

VOLUME 1

INTRODUCTION AND EXECUTIVE SUMMARY

SECTION 1

CHAPTER

- 1 PROJECT BACKGROUND AND OVERVIEW
- 2 MINING
- 3 PROCESSING
- 4 PROCESSED SHALE AND DEVELOPMENT ORE DISPOSAL
- 5 SUPPORT FACILITIES
- 6 ENVIRONMENTAL PROTECTION, HEALTH & SAFETY
- 7 ENVIRONMENTAL ASSESSMENT
- 8 ENVIRONMENTAL MONITORING

VOLUME 2

MINING, PROCESSING AND SUPPORT FACILITIES

SECTION 2

MINING

CHAPTER

- 1 INTRODUCTION
- 2 SITE DESCRIPTION
- 3 GEOLOGY
- 4 HYDROLOGY
- 5 ROCK MECHANICS
- 6 MINE DESIGN
- 7 SCENARIOS
- 8 SUBSIDENCE
- 9 MINING ALTERNATIVES AND SELECTION

SECTION 3

PROCESSING

CHAPTER

- 1 INTRODUCTION
- 2 MODULAR DEVELOPMENT PHASE PROCESSING OPERATIONS
- 3 COMMERCIAL PHASE PROCESSING OPERATIONS
- 4 PLANT PLAN
- 5 COMMERCIAL PHASE PROCESSING ALTERNATES
- 6 MODULAR DEVELOPMENT PHASE PROCESSING ALTERNATES

SECTION 4

PROCESSED SHALE & DEVELOPMENT ORE DISPOSAL

CHAPTER

- 1 INTRODUCTION
- 2 PROCESSED SHALE DISPOSAL OPERATION
- 3 DEVELOPMENT ORE DISPOSAL OPERATION

SECTION 5

SUPPORT FACILITIES

CHAPTER

- 1 INTRODUCTION
- 2 TRANSPORTATION
- 3 POWER SUPPLY AND DISTRIBUTION
- 4 PRODUCT PIPELINE
- 5 WATER MANAGEMENT
- 6 COMMUNICATIONS
- 7 FUEL STORAGE AND HANDLING
- 8 BUILDINGS
- 9 EXPLOSIVE STORAGE AND HANDLING

VOLUME 3

ENVIRONMENTAL PROTECTION & MONITORING

SECTION 6

ENVIRONMENTAL PROTECTION, HEALTH & SAFETY

CHAPTER

- 1 INTRODUCTION
- 2 HEALTH AND SAFETY
- 3 FIRE PREVENTION AND CONTROL
- 4 NOISE CONTROL
- 5 AIR QUALITY CONTROL
- 6 WATER QUALITY CONTROL
- 7 OIL AND HAZARDOUS MATERIAL CONTROL
- 8 LAND REMEDIATION AND EROSION CONTROL
- 9 SOLID WASTE CONTROL
- 10 AESTHETICS
- 11 FISH AND WILDLIFE MANAGEMENT PLAN
- 12 PROTECTION OF OBJECTS OF SCIENTIFIC AND HISTORIC INTEREST
- 13 SUBSIDENCE CONTROL
- 14 ABANDONMENT

SECTION 7

ENVIRONMENTAL ASSESSMENT

CHAPTER

- 1 INTRODUCTION
- 2 ENVIRONMENTAL SETTING AND WILDLIFE INVENTORY
- 3 AIR
- 4 ASSESSMENT AND MITIGATION OF POTENTIAL TERRESTRIAL IMPACTS
- 5 ASSESSMENT AND MITIGATION OF POTENTIAL AERIAL IMPACTS
- 6 ASSESSMENT AND MITIGATION OF HYDROLOGY IMPACTS
- 7 ASSESSMENT AND MITIGATION OF IMPACTS ON CULTURAL RESOURCES

SECTION 8

ENVIRONMENTAL MONITORING

CHAPTER

- 1 INTRODUCTION
- 2 AIR QUALITY
- 3 METEOROLOGY
- 4 TERRESTRIAL ECOLOGY
- 5 AQUATIC ECOLOGY
- 6 HYDROLOGY
- 7 VEGETATION
- 8 SUBSIDENCE
- 9 NOISE

VOLUME 4

CONFIDENTIAL VOLUME

APPENDIX B

POPULATION - RIO BLANCO AND GARFIELD COUNTIES

The following special census preliminary population count for Garfield and Rio Blanco Counties of Region XI has been furnished by the Census Bureau.

<u>Garfield County</u>				
	<u>1970</u>	<u>1977</u>	<u>Increase</u>	<u>Percent Gain-Loss</u>
County	14,821	18,774	3,953	26.6
Carbondale	726	1,644	918	126.4
Glenwood Springs	4,040	4,090	50	1.2
Grand Valley	270	377	107	39.6
New Castle	499	543	44	8.8
Rifle	2,150	2,242	92	4.2
Silt	434	856	422	97.2
Rural Area	6,702	9,022	2,320	34.6
<u>Rio Blanco County</u>				
County	4,842	5,103	261	5.4
Meeker	1,597	1,848	251	15.7
Rangely	1,591	1,872	281	17.7
Rural Area	1,654	1,383	-271	-16.3

Source: Special Census, U. S. Census Bureau



